Chapter 3 Affected Environment, Environmental Consequences, And Mitigation Measures

3.1 INTRODUCTION AND SUMMARY OF IMPACTS

Table 2 provides a summary of the impacts of the proposed action. Subsequent sections in this chapter provide more detail, resource by resource, about those impacts. Each section first describes the environment that could be affected by the alternatives, and then the impacts, including cumulative impacts, of the proposal. Relevant mitigation measures are described at the end of each section. Impacts of No Action would vary, depending on whether or not another entity builds the facilities. Those impacts could be similar to the proposal or could be limited to the socioeconomic effects of not supplying electricity demands (Section 2.2).

3.2 LAND USE

3.2.1 Affected Environment

The project area is located in a rural part of central King County, Washington. Figure 5 shows the principal types of land use in the project area. Land is principally under private ownership, and includes developed and undeveloped rural-residential parcels, a number of residential subdivisions in various stages of development, and a relatively new business park that is currently marketing building sites. Public land in the area is used primarily for rights-of-way, including city (Snoqualmie and North Bend) and King County roads as well as Interstate Highway 90 (I-90). Four small creeks are in the immediate project area: D, Coal, Kimball, and Gardiner creeks. Adjacent to Gardiner Creek, within the North Bend right-of-way, a memorial shrine marks the location where a North Bend High School student recently died in an automobile accident. The South Fork of the Snoqualmie River is about 1 km (0.6 mi) east of the proposed substation.

Land uses in the immediate project vicinity are mostly rural residential property in unincorporated King County and more urbanized uses within the communities of Snoqualmie and North Bend. Unincorporated land is zoned primarily RA-5 (Rural-Residential, 5 acre minimum) and UR (Urban Reserve) (Figure 6).

BPA has an existing high-voltage transmission line in the area, the Echo Lake-Monroe 500-kV line, which occupies a 45-m (150-ft) right-of-way (see Figure 7, Right-of-Way Alignment Detail Near SE 356th Avenue). In addition, Puget has two existing 115-kV transmission lines in the area, one of which BPA proposes to tap for this project (Snoqualmie-Lake Tradition No. 1). (See Figure 1.)

Puget also has a 12.5-kilovolt (12.5-kV) distribution line in the area that serves the utility's customers. It takes power out of the North Bend Substation, and parallels North Bend Way and Alm Way. No high-voltage lines currently exist along North Bend Way,

and no distribution line currently exists along North Bend Way between Alm Way and downtown North Bend.

Table 2 Summary of Impacts of the Proposed Action

Resource	Impacts
Land Use	• Right-of-way and substation remove 3.3 ha (8.3 ac) of land from other potential development. • Right-of-way limits uses on several properties. • Transmission line is added to public road rights-of-way where no line currently exists or replaces an existing distribution line with a larger facility.
Geology/Soils	• Minor, short-term increases in erosion and run-off rates, controlled by Best Management Practices (BMPs).
Water Quality	• Same as geology/soils.
Vegetation	• 6.4 ha (16 ac) tall-growing conifers and deciduous trees are replaced with low-growing vegetation.
Wetlands/Flood-plains	• Removal of a few tall-growing trees from wetlands and wetland buffers. • Placement of rock and concrete footing below the 100-year flood elevation at substation site.
Fish & Wildlife	• Substation removes 0.4 ha (1 ac) of grassland habitat. • Transmission line converts 6.4 ha (16 ac) of wooded habitat to low-growing shrub or grass habitat.
Visual Quality	• Transmission line visible to residents along SE 356th Ave., 96th Way, North Bend Way, and 106th Place/Alm Way. • In areas listed above, vegetative screens removed from between residents and private and public roads. • For 1 km (0.6 mi), transmission line partially visible to motorists on I-90, a National Scenic Byway. • Substation visible to users of Alm Way and NW 8th St. for short distance.
Socioeconomics	• Minor, short-term noise, dust, and traffic delays during 3-4 month construction period. • Potential for employment of 8-12 workers during construction period. • Estimated state sales taxes of $26,000 based on estimated after-tax payroll and average spending by non-local workers. • Potential for minor short-term reduction (0–2 percent) in property values of residences near line. • Minor sales and property tax benefits of substation construction and operation.
Cultural Resources	• No impacts.
Health & Safety	• Increase in EMF of 0-3 mG, depending on location, but no increase in exposure to residents due to distance from line.
Noise & Radio/TV Interference	• No impacts expected.

3.2.2 Environmental Consequences

Where the proposed route would use existing BPA right-of-way, eight residential properties would have two BPA lines across them—the existing 500-kV line and the new 115-kV line. The new right-of-way would further restrict the owners' use of their property by preventing construction of any buildings, storing of flammable materials, or growing vegetation to heights that would interfere with the safe operation and maintenance of the line. BPA recognizes these impacts or additional burdens on private property when calculating fair market value for obtaining easements. Fair market value is intended to compensate landowners for the limitations placed on their property. No residents would be displaced by the proposed action and the impacts of restricted use are considered to be minor. (See also Section 3.9, Socioeconomics, for a discussion on property value impacts related to the presence of transmission lines near residential dwellings).

The proposed right-of-way would remove from potential development approximately 1.2 ha (3 ac) south of the Snoqualmie Ridge Business Park and north of SE 96th Street. Zoning on that parcel is "Rural Area, 5 acres" (RA-5) (see Figure 6), but there are no specific plans for its development at this time. BPA would site the transmission line on the eastern edge of this undeveloped parcel to allow the preservation of a visual buffer between the line and the residents on the east side of SE 356th Avenue (see Section 3.8, Visual Quality). Impacts would be mitigated by BPA purchasing a right-of-way across the parcel, with the value established during the appraisal process (see Section 3.9, Socioeconomics). Because of the large amount of undeveloped land in the area, removing this parcel from commercial or residential development would have a minor impact on the amount of developable land.

The existing steel transmission tower supporting BPA's 500-kV line near SE 96th Way would need to be moved approximately 15 m (50 ft) to the south so that the proposed 115-kV transmission line could pass underneath the larger transmission line. No change in land use would occur and no additional land rights would be sought.

Constructing a transmission line in the North Bend Way right-of-way east of Alm Way and in the I-90 right-of-way would add a facility to public rights-of-way where no utility line exists now. This new use would occur for only about 245 m (800 ft) on North Bend Way and for 1 km (0.6 mi) on I-90. (See also Section 3.8, Visual Quality and Section 3.5, Vegetation). Where the new line would replace Puget's existing distribution line along North Bend Way, the land use would not change, although the visual effect would be different (see Section 3.8). BPA would design the transmission line so that Puget could relocate their distribution line on BPA structures, assuming Puget obtains their own land rights for doing so. If Puget places its distribution lines on BPA's transmission structures, less right-of-way would be needed and the visual impact would be lower than having separate lines in the same right-of-way (see Section 3.8.3, Visual Quality, Cumulative Impacts). Both King County and City of North Bend development policies encourage the multiple use of transportation corridors with utilities. With mitigation, these impacts are expected to be low to moderate.

The proposed action, including the substation, would not remove the large spruce trees at the memorial shrine near the Gardiner Creek Bridge or otherwise disturb the site. The memorial shrine would not be affected by the proposed project.

Construction of the substation would place an industrial facility on a parcel of land that currently is undeveloped. Constructing a substation by a non-federal entity in the Employment Park Zone (Figure 6) within the City of North Bend requires a conditional use permit from the city. Tanner is expected to meet conditions for having a substation on that site including noise, height, and visual quality standards. The substation would not adversely affect sensitive environmental resources, such as wetlands/floodplains (see applicable sections in this EA). Tanner's conditional use permit also is conditioned on BPA obtaining environmental clearance on the proposed transmission line that would energize the substation.

Constructing an additional substation in North Bend to serve existing and future Tanner customers, and reserving a bay in the substation for Puget's future use, is consistent with the city's comprehensive plan, which has identified the need for only a single additional substation in North Bend until the year 2020.

3.2.3 Cumulative Impacts

Although they are a component of society's infrastructure needed for basic human health and safety, transmission lines and distribution lines also contribute to the alteration of the area's natural environment that has taken place since the arrival of the first settlers in the mid-1800s.

In an attempt to minimize impacts and implement "one-utility planning," BPA would design the transmission structures to accommodate Puget's distribution line and the local telephone line. Constructing a single set of poles to accommodate a transmission line, a distribution line, and a telephone line minimizes the number of utility poles needed, thus minimizing the cumulative land use impacts associated with overhead utilities in the area. Likewise, Tanner's proposed substation would be designed to fulfill needs for both Tanner and Puget, further minimizing the cumulative impacts of multiple facilities. Maximizing use of existing public rights-of-way also reduces the amount of private land converted to public uses.

3.2.4 Mitigation

- BPA would work with landowners to site wood-pole structures and to relocate the 500-kV steel structure to minimize impacts to residential properties.
- In constructing the transmission line, BPA would meet state and local safety requirements and the requirements of the **National Electric Safety Code**, including those governing ground clearances.
- BPA would pay fair market value for any easement acquired on private land. Such values would be determined during the appraisal process.

3.3 GEOLOGY/SOILS

3.3.1 Affected Environment

Within the immediate project area, soils have formed in a mixture of volcanic ash and dense glacial till or in alluvium deposited on river terraces and floodplains. Overall, most soils are moderately well drained, but in many areas a cemented layer inhibits drainage at about 1 m (3 ft) below the surface. Very poorly drained soils have formed where herbaceous and woody organic materials were deposited in depressions; these soils often support wetland vegetation.

The line crosses moderately steep to steep slopes in the hills west of the Snoqualmie River Valley. Near Tanner's proposed substation site, the line would be located on the valley's nearly level floodplain. Elevations range from about 130 m (425 ft) above sea level near the substation site to about 310 m (1020 ft) in the western hills. Run-off is slow and the hazard of water erosion is slight along most of the route (USDA-SCS 1992).

3.3.2 Environmental Consequences

Soils denuded of vegetation or disturbed by construction activities are more susceptible to erosion and mass movement. An increase in erosion can reduce soil productivity and degrade water quality. The amount of soil erosion caused by construction is a function of soil properties, slope, vegetation, rainfall patterns, and construction practices.

Impacts would be primarily related to disturbances associated with right-of-way clearing, road improvements, installation of wood-pole structures, and conductor stringing operations. Impacts would include localized increases in erosion and run-off rates at construction sites. Soils are susceptible to compaction and rutting, and unsurfaced roads may be impassable when wet. Use of heavy equipment could compact soils, reducing soil productivity. Impacts would be highest during and immediately after construction. Impact intensity would diminish as disturbed sites are stabilized and re-vegetated, consequently reducing run-off and erosion. Localized changes in run-off and erosion patterns at structure sites or on new or modified access roads are possible long-term impacts.

A portion of the project would cross an area designated by King County as an erosion hazard area (Figure 4). Development in these areas requires that a soil erosion and sediment control plan be developed prior to construction. Implementation of best management practices (BMPs) to prevent erosion and control run-off will minimize impacts posed by project construction and operation and prevent damage to downstream receiving waters. Overall, construction, operation, and maintenance impacts are expected to be low.

Landslides can be initiated where construction undercuts unstable slopes or where excessive fill is placed at the top of susceptible slopes. In addition, increases in the quantity of water that flows onto or infiltrates a susceptible slope can increase the

landslide risk. The proposed route avoids landslide hazard areas identified by King County. An engineering geologic reconnaissance of potential landslide hazard areas along the proposed alignment was completed in March 1998 (Golder Associates 1998). No active landslides were found and the project should have little permanent effect on slope stability if best management practices (BMPs) are followed (see Section 3.3.4). See Section (3.4) for a discussion of impacts to water quality.

3.3.3 Cumulative Impacts

All land development activities create the potential for erosion and sediments to leave construction sites and enter surface waters. Construction of the proposed project would add to the existing disturbed lands in the area. Minor, localized, short-term increases in erosion, runoff, and sedimentation would be expected from project construction and maintenance. Overall, with implementation of BMPs for erosion, sediment, and runoff control, these increases would have a low cumulative impact on the area's soil resources.

3.3.4 Mitigation

Minimizing disturbance and erosion is a concern at all transmission structure sites, construction staging areas, and where access roads would be modified or improved. By following BMPs that conform to the Washington Department of Ecology (WDOE) standards, impacts would be reduced or eliminated at all sites. The following BMPs would be implemented as appropriate:

- Disturbed areas would be returned to their original contour and promptly seeded with a herbaceous seed mixture suited to the site.
- Sediment barriers and other suitable erosion and run-off control devices would be installed where needed to minimize off-site movement of sediment. The erosion control devices will be left in place until the site becomes stable.
- New access roads would be properly designed with proper road drainage systems, including both surface and subsurface, to control runoff and erosion.
- When practical, construction activities would be avoided when soil is wet to reduce soil compaction, rutting, and the resultant loss in soil productivity. See Section 3.4, Water Quality, for related impacts and mitigation.
- Grading and other disturbance of the natural vegetative cover would be minimized.
- Where practical, construction would be limited to the dry season in steep areas, and permanent erosion protection and re-vegetation of disturbed slopes and surface water control measures will be established immediately following construction.

3.4 WATER QUALITY

3.4.1 Affected Environment

Located on the west side of the Cascades, the climate of the project area is subject to a heavy marine influence from the Pacific Ocean. Summers are relatively warm, but hot days are rare; winters are cool, but freezing temperatures and snow are infrequent at lower elevations. The average annual precipitation at Snoqualmie Falls is about 150 centimeters (60 inches), most of which falls between October and April (USDA-SCS, 1973). Several small tributaries of the Snoqualmie and South Fork Snoqualmie rivers would be crossed by the project, including D Creek, Coal Creek, Kimball Creek, and the intermittent stream, Gardiner Creek.

Section 303(d) of the Federal Clean Water Act requires each state to develop a list of water bodies that do not meet established water quality standards. In Washington, WDOE develops the standards that protect beneficial uses such as drinking water, fisheries, and recreation. Parameters that WDOE typically monitors include bacteria, pH, dissolved oxygen, temperature, total dissolved gas, certain toxic and carcinogenic compounds, habitat and flow modification, and aquatic weeds or algae that affect aquatic life. None of the streams crossed by the project are on the 303(d) list. However, these streams are tributaries to the Snoqualmie or South Fork Snoqualmie rivers, which are 303(d)-listed for exceeding water temperature criteria.

No sole source aquifers designated or proposed by the U.S. Environmental Protection Agency exist in the area (US-EPA 1996), however, a number of domestic water wells and one municipal water well are located within the project area.

3.4.2 Environmental Consequences

Impacts would be associated primarily with ground disturbance from right-of-way clearing, access road construction and improvements, installation of wood poles, and stringing operations. Vegetation removal and soil disturbance increases erosion, run-off, and the risk of sediment reaching surface waters. Access roads are susceptible to rutting when wet, which can result in run-off and sediment being channeled into streams. The likelihood and intensity of surface water impacts depend on the amount of disturbance, slope, vegetation cover, soil characteristics, season, and susceptibility of disturbed areas to erosion. Sediment affects water clarity, plant and fish habitat, and water temperature and chemistry.

Overall impacts from the project would be low and limited to localized increases in erosion and run-off. The intensity of impacts would diminish after the site is restored and erosion and run-off control measures take effect. Impacts associated with line construction and maintenance will be minimized because a corridor and access road system already exists along much of the proposed route.

Construction activities would not exacerbate the 303(d) criteria that currently are exceeded in the Snoqualmie and South Fork Snoqualmie rivers because the small amount of clearing required near tributary streams is not likely to increase their temperature significantly or to result in temperature increases downstream.

The project is located within the boundaries of the East King County Groundwater Management Area (King County DNR, 1998). Activities associated with the installation of wood poles would not directly or indirectly introduce contaminates into the aquifers. The project would not degrade the quality of aquifers or jeopardize their use as a drinking water source. In addition, the project would not affect the chemical or biological characteristics of surface or ground waters in the area. It is unlikely that herbicides would be used during project construction, although they might be used selectively on cut stumps of deciduous trees to prevent re-sprouting. BPA commonly uses herbicides during maintenance activities. (See BPA's Transmission System "Vegetation Management Program Final Environmental Impact Statement," DOE EIS-0285, May 2000.) Prior to using any herbicides, however, BPA would contact affected landowners to find out if they have concerns with the use of herbicides on or near their property. BPA's policy on herbicide use in the vicinity of domestic/public drinking water wells is to maintain a 50-m (164-ft) buffer for any herbicide having a ground/surface water advisory, or a 15-m (50-ft) buffer for any other herbicide. Any herbicide used in construction, operation, or maintenance of the proposed project, including the substation, would be EPA-approved and would be applied according to label instructions.

3.4.3 Cumulative Impacts

Current and future land use development in the watershed might increase peak flows and introduce sediment into streams, depending on site-specific conditions. Only temporary increases of sediment in streams are expected from construction of the proposed transmission line, access roads, and substation. Mitigation measures proposed for this project would reduce the chance of large amounts of sediment entering streams. It is unlikely, therefore, that the proposed action, when added to past actions, current proposals, and future developments, would measurably contribute to degradation of the area's water quality.

3.4.4 Mitigation

Because of the interrelationship between soil erosion and surface water quality, successful implementation of run-off and erosion controls is important in protecting water quality (see Section 3.3, Geology/Soils). Standard mitigation would implement the measures best suited to each individual location to eliminate or reduce erosion and run-off and stabilize disturbed areas. A number of measures, including but not limited to the following, would be used alone or in combination:

- Best Management Practices (BMPs) to control erosion and run-off would be employed to eliminate or minimize water quality impacts.

- Sediment barriers such as straw bales or silt fences would be used where needed, including at the substation site, to prevent off-site movement of sediment. Devices would be left in place until the site becomes stable.
- Disturbed areas would be seeded immediately following construction with a seed mixture suited to the site. Areas include sites disturbed by installation of transmission poles and where construction activities have affected vegetation adjacent to streams or wetlands.
- Traffic across wet soils susceptible to rutting would be limited.
- Streams would be crossed only at existing crossings; no fords would be constructed.
- If it is necessary to improve or add stream crossings, culverts or other structures would be designed and installed to provide unobstructed stream flow and minimal change to the stream course.
- If practical, construction activities would be timed to reduce erosion by conducting operations during low-runoff periods.
- Roads that must be used during wet periods would have a stable surface and sufficient drainage to allow such use with a minimum impact. Gravel may be necessary to protect some road surfaces and reduce the potential for erosion.
- Any gravel used for access road improvements near water bodies or wetlands would be clean.
- Any stream bank damage would be repaired and the site stabilized immediately.
- No solid materials, including building materials, would be discharged into surface waters.

3.5 VEGETATION

3.5.1 Affected Environment

The vegetation in the Northwest has been characterized on the basis of physiographic provinces and vegetation zones. According to this system of classification, the project area is located within the Puget Trough Physiographic Province and the *Tsuga heterophylla* (western hemlock) Vegetation Zone (Franklin and Dyrness 1969).

The *Tsuga heterophylla* zone (based on the potential climax species) is considered the most extensive vegetation zone in western Washington and Oregon (Franklin and Dyrness 1969). Most common tree species found in this zone are coniferous species: Douglas fir, western red cedar, and western hemlock, the latter being the major climax species. Hardwoods are not common except on recently disturbed sites or in specialized habitats such as in riparian zones, and they are almost always subordinate to the coniferous species. The vast majority of the zone in the project area has either been logged or burned during the last 150 years.

The understory in the *Tsuga heterophylla* zone depends on local moisture regimes, but in the project area most typically is composed of Oregon grape, salal, swordfern, and other herbaceous species. Other shrubs commonly found in the understory are vine maple, fireweed, common thistle, and bracken fern. No federally listed threatened or endangered plants fall within any of the four townships within which the project is located (WDNR 1999).

Noxious weeds are undesirable plant species that pose a major threat to agriculture and/or native plant communities. Noxious weeds likely to be found in the North Bend/Snoqualmie area are spotted knapweed, yellow and dalmation toadflax, yellow and orange hawkweed, tansy ragwort, rush skeleton weed, St. Johns ragwort, Scots broom, and sulfur cinquefoil (Jane Wentworth, Program Manager, Noxious Weed Control Program, King County Department of Natural Resources, telephone and written communication, January 18, 2000).

During project review, evidence of a fungus that attacks the roots of conifers was observed on trees within the right-of-way of I-90. Although a number of these trees are still standing, some do not appear to be alive.

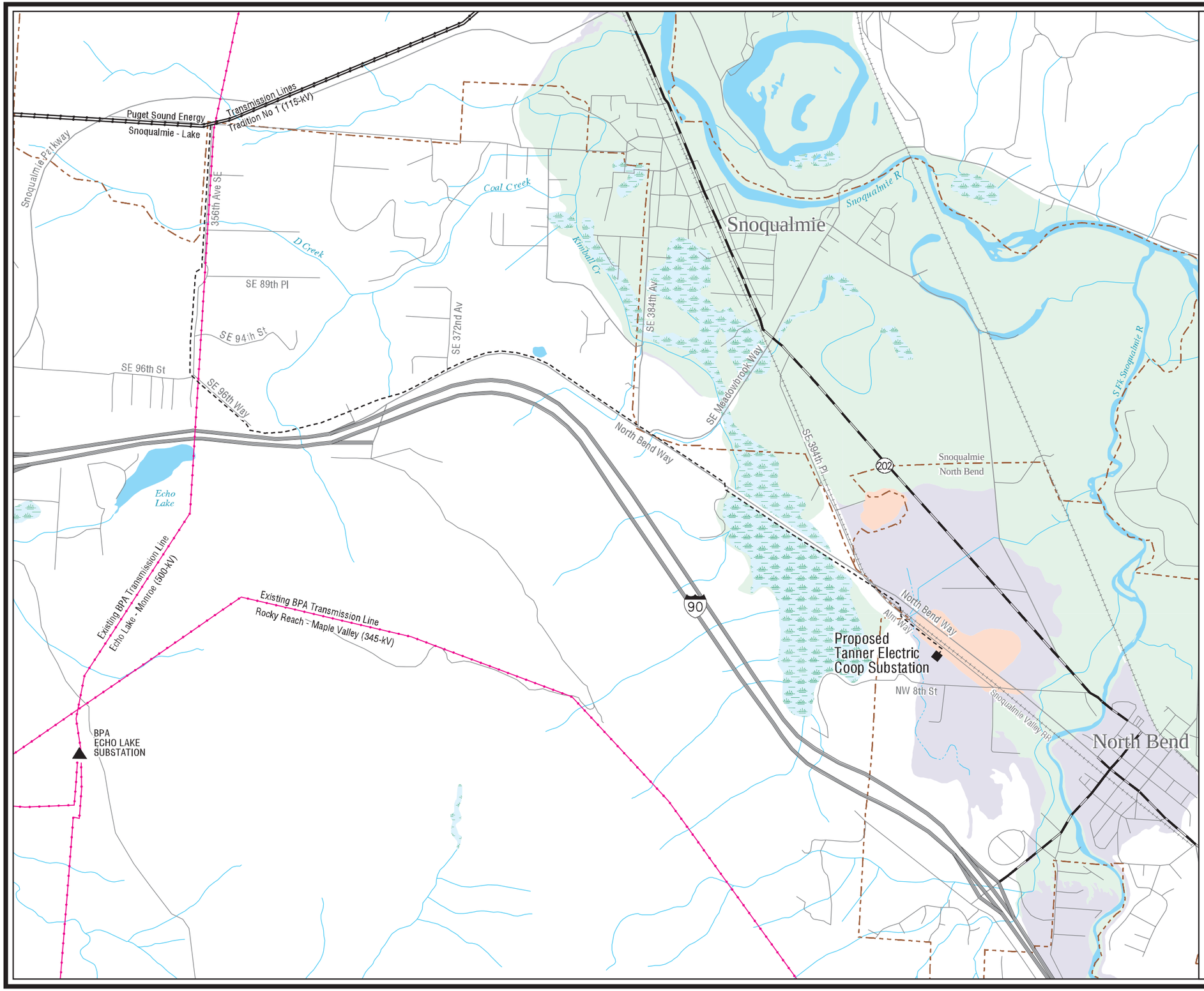
3.5.2 Environmental Consequences

Construction, operation, and maintenance of transmission facilities can directly affect vegetation resources. Short-term impacts can occur during project construction and usually have minimal lasting impacts on vegetation. Other impacts are long term, such as ongoing maintenance practices that can permanently alter plant species composition and plant communities. Tall growing vegetation would be removed for right-of-way clearing, to eliminate danger trees, and to construct access roads. Ground disturbance from construction and stringing operations can remove or damage existing vegetation, cause invasion and spread of undesirable plant communities, adversely impact sensitive or protected plants (if present), or create erosion on steep slopes. Vegetation management activities also can alter and influence the types of plants that grow in the right-of-way.

A portion of the proposed route has already been cleared, i.e., along BPA's right-of-way and along North Bend Way, although additional clearing would be required to construct, operate, and maintain the line safely and reliably. Right-of-way clearing would remove approximately 6.4 ha (16 ac) of vegetation consisting of both conifers (Douglas fir, western red cedar, and hemlock) and deciduous trees (largely alder, cottonwood, and maple). Development of access roads would remove some additional tall growing vegetation, but mostly the access roads would be within the right-of-way. (See also Section 3.8, Visual Quality.)

Noxious weeds can spread quickly along the length of a transmission line right-of-way, and this is especially true for new rights-of-way or new construction on existing rights-of-way, where weeds have not been a problem previously. BPA would survey for the presence of noxious weeds before construction activities begin. If weeds are found along the project route, care would be taken to prevent their proliferation. With mitigation (see Section 3.5.4), this impact is expected to be minor.

FIGURE 8
WETLANDS / FLOODPLAINS
TANNER ELECTRIC
TRANSMISSION LINE PROJECT



LEGEND

- Proposed route
- Existing BPA Transmission line
- Existing PSE Transmission line
- Existing Substation
- Proposed Substation
- City boundary
- 100 Year Floodplain
- 500 Year Floodplain
- Over 500 Year Floodplain
- Wetlands

Source: King County GIS, 1999.

N
W E
S

Scale 1:24000

0ft 1000ft 2000ft 3000ft 4000ft 5000ft

0km 1km

BONNEVILLE POWER ADMINISTRATION
GIS
GEOGRAPHIC INFORMATION SYSTEM

dw99061 August 01, 2000

Some of the trees that would be removed from the I-90 right-of-way have been afflicted with a fungus, and some are no longer alive. These trees would be removed carefully, to prevent the spread of the fungus to other trees nearby (see Section 3.5.4). With mitigation, this impact would be low.

3.5.3 Cumulative Impacts

The proposed action would increase the width of BPA's existing cleared right-of-way in the area to be paralleled by the new line from 50 to 57.5 m (150 ft to 172.5 ft) and would clear new areas along the remainder of the proposed line. If another north-south line were needed in the area in the future, it could be sited within the existing BPA Echo Lake-Monroe right-of-way (in a **double-circuit** configuration), adjacent to it (on a parallel right-of-way), or further away from the corridor. Expanding the right-of-way and adding a transmission line could further impact the vegetation in the area during line construction and maintenance. Plants would be removed from the plant community and noxious weeds could invade the area. However, compared to the impacts of the continued urbanization of this area, the contribution of the proposal to the continuing and cumulative reduction in the amount of vegetation is expected to be low.

3.5.4 Mitigation

To minimize the likelihood of impacts, the following mitigation measures will be implemented:

- Clearing would be minimized throughout the project.
- At structure sites, vehicles would not be allowed off roads.
- BPA would undertake a noxious weed survey before construction activities begin. Where noxious weed have been identified, all construction vehicles would be washed before entering and after leaving project sites. Following the completion of construction activities, follow-up surveys will be made, as necessary.
- Immediately after construction, disturbed areas would be re-vegetated with low growing vegetation to guard against the proliferation of noxious weeds and the potential for erosion, and to preserve visual quality.
- To reduce the chance of spreading the fungus disease to non-infected trees within the I-90 right-of-way, BPA would clear the trees and construct access roads during the dry season (April through mid-October).

3.6 WETLANDS AND FLOODPLAINS

3.6.1 Affected Environment

Wetland ecosystems depend on constant or recurrent shallow flooding or saturation at or near the soil surface. Wetlands can be biologically highly productive and are protected by the Clean Water Act. Wetland benefits include improved water quality, flood control, and wildlife habitat, in addition to recreational and aesthetic outlets.

Within the project area, wetlands have developed on floodplains and terraces, along streams, and in the vicinity of hillside seeps. These wetlands are flooded for variable periods during the growing season. **Palustrine forested**, **palustrine scrub-shrub**, and **palustrine emergent** wetlands occur along the proposed right-of-way. The largest wetland is associated with Kimball Creek along North Bend Way (Figure 8).

Common tree species within forested wetland areas include red alder, black cottonwood, western red cedar, and Sitka spruce. Shrub species include Pacific willow, Sitka willow, stink current, red rosier dogwood, rose, prickly current, salmonberry and devil's club (Beak Consultants 1997).

3.6.2 Environmental Consequences

Wetlands could be affected if construction activities alter wetland vegetation, soils, or hydrology. Construction, clearing activities, and any necessary road improvements could potentially affect sediment transport, damage vegetation and wildlife habitat, and reduce a wetland's ability to provide for flood and sediment control.

In accordance with U.S. DOE regulations on compliance with Floodplain/Wetlands Environmental Review Requirements (10 Code of Federal Regulations (CFR) 1022.12), BPA has prepared the following assessment of the project's impacts on floodplains and wetlands. A Floodplain/Wetland Notice of Involvement was published in the Federal Register on February 24, 2000.

The proposed route would cross a number of small wetlands. Until project design is finalized, the exact locations of transmission structures are not known. However, most wetlands crossed are narrow and will be spanned where practical. Impacts would be related primarily to removal of tall trees from wetlands and associated buffers. In addition, a few poles would likely be sited in wetland buffers, which range from 8 to 30 m (25 to 100 ft) depending on the jurisdiction involved, and would result in short-term localized disturbance at structure bases.

The proposed alignment bisects the large palustrine scrub-shrub and forested wetland associated with Kimball Creek for about 0.8 km (0.5 mi). However, the line would be located on existing fill within the North Bend Way right-of-way and no structures would be placed in the wetland. Impact would be limited to removal of a few tall trees from the

wetland to maintain line safety and reliability. Because existing access is in place, no new roads would be constructed in the wetland.

Under Executive Order 11988, Federal agencies must avoid or minimize adverse impacts associated with short-term or long-term modification and occupancy of floodplains. Modification and destabilization of the floodplain could have potentially adverse effects not only near the disturbance, but also in the stream channel and floodplain great distances downstream. Adverse impacts include the potential for flood damage to the facilities, increased flooding due to displacement of water from the normal floodplain by construction of the facilities, and increased potential for erosion of floodplain soil and sediment near construction sites.

The proposed route crosses the 100-year floodplain adjacent to Kimball Creek where it would be located on existing fill. Except near the creek, the line would be at an elevation higher than the flood elevation (FEMA, 1989). Any structures placed within the 100-year floodplain would be designed to withstand flooding, not impede expected flows, and prevent accumulation of flood debris. The project would not increase the chance of flooding or flood-related damage.

Substation construction would remove relatively porous soil below the 100-year flood elevation and replace it with less porous concrete footings and gravel. Tanner Electric is required to compensate for the resulting loss of water storage capacity on a one-for-one basis. To satisfy this requirement, Tanner will remove soil over an area approximately 46 m (150 ft) by 44 m (145 ft) by 26 cm (13 in) deep. The amount of material removed by the excavation (667 cubic meters [873 cubic yards]) would make up for the storage capacity lost by substation construction. The excavated soil will be placed outside of the floodplain to avoid additional impacts.

Increases in run-off and stream flows due to project clearing and access road construction are expected to be minor. Overall, the proposed project would not adversely affect human life, property, or natural floodplain values.

3.6.3 Cumulative Impacts

Past actions have encroached on wetland areas, reducing their size and number in the Upper Snoqualmie Valley. This has contributed to increases in runoff and stream flows. Throughout the U.S., the historic loss of wetlands and problems caused by construction in 100-year floodplains have been well documented. Any impacts to wetlands would add to the cumulative loss of these resources, and construction within 100-year floodplains could affect the base flood elevations if not mitigated. However, with implementation of effective mitigation as described below, the project would not contribute to the cumulative loss of these important resources.

3.6.4 Mitigation

To eliminate or reduce impacts to wetlands and to the floodplain of Gardiner Creek, the following actions would be taken:

- Transmission poles would be placed to avoid impacts to wetlands and floodplains. Wetlands would be spanned where practical.
- Best management practices (BMPs) would be employed to control erosion and run-off and to avoid adversely affecting wetlands and associated aquatic resources.
- Manual methods would be employed to remove trees or vegetation determined to be a hazard to transmission line safety and reliability. Vegetation would not be bladed.
- Gravel would not be placed within wetlands unless necessary to access a work site.
- Existing roads would be used where possible to provide access through the wetland.
- Excavated material would not be disposed of within wetlands or wetland buffer areas.
- At the substation site, any soil removed for construction of the facility would be deposited in uplands.
- Access roads would be located to avoid wetlands where practical. If access is required through wetlands, roads would be located to minimize impacts and constructed in compliance with all applicable permits.

3.7 FISH AND WILDLIFE

3.7.1 Affected Environment

Although the entire project area has been logged in the past, much of the area supports a relatively undisturbed, mature forest canopy (Beak Consultants 1997). The proposed project crosses several different types of habitat including both upland and wetland environments. Upland habitat includes mixed stands of second- and third-growth conifers such as Douglas fir, western red cedar, and western hemlock (the climax species in the area) mixed with deciduous trees such as alder, maple and black cottonwood. Understories contain salmonberry, Oregon grape, blackberry, salal, swordfern, and other herbaceous species. Wetland habitats, including forested, scrub-shrub, and open-water wetlands, exist throughout the project area. The largest of these is associated with Kimball Creek along North Bend Way (see Section 3.6). Additional habitats in the area include those associated with rural-residential areas and open grasslands, such as that found in North Bend where Tanner would build the substation.

In general, the wetland associated with Kimball Creek and surrounding upland habitats throughout the project vicinity support a large number of snags, a good diversity of native plants, and a high level of vegetative structure. Although all of these habitats are important for the species they support, none found in the area are considered rare or unique, and all are common throughout northwest Washington at these elevations.

Three small perennial streams, D Creek, Coal Creek, and Kimball Creek,and one ephemeral stream, Gardiner Creek, are located in the immediate project area. D Creek is a tributary to Coal Creek and Coal Creek is a tributary to Kimball Creek. According to the Washington Streamnet Database (WDFW 1999a), sculpin and resident coastal

cutthroat trout are found in Coal Creek and Kimball Creek; however no fish are known to be in the upper Coal Creek tributaries such as D Creek. In nearby rivers outside the immediate project area, including the South Fork Snoqualmie and Snoqualmie rivers, other fish species include rainbow trout and Montana whitefish.

Many species of mammals and birds are found in the project area, including deer *(Odocoileus),* coyote (*Canis latrans),* and possibly black bear *(Ursus americanus).* It has also been reported that cougars (*Felis concolor*) have recently been seen in the project area. Birds include waterfowl and raptors such as red-tailed hawks (*Butteo jamaicensis*), and other large and small birds including pileated woodpeckers (*Dryocopus pileatus),* crows *(Corvus brachyrhychos),* Steller's jays *(Cynanocitta stelleri),* juncos (*Junco hyemalis*), and black-capped chickadees (*Parus atricapillus).* Reptiles most commonly encountered in the project area are northwestern garter snakes (*Thamnophis spp*.).

Sensitive species in the area listed by either federal or state governments include peregrine falcon, osprey, gray wolf, fisher, and northern spotted owl. None, however, are found within 3 km (2 mi) of the project area (WDFW 1999b). The closest critical habitat of the northern spotted owl is found a minimum of 13 km (8 mi) away (USFWS 1999 data). No federally listed or state-listed fish species are found in the local area (WDFW 1999a). (Also see Section 4.2.)

3.7.2 Environmental Consequences

The proposed action would alter some habitats by removing tall growing vegetation and encouraging the growth of low growing plant communities. Removing vegetation such as snags could deplete wildlife habitat upon which some species such as the pileated woodpecker depend. Removing the vegetation from wetlands and wetland buffers could harm wildlife habitats and the species that depend on them. Where possible, snags and felled trees will be left in place (see Section 3.7.4).

The proposed transmission line would cross several streams. Construction activity could allow sediments to reach surface waters. With mitigation, the proposed action would not affect water quality (see Section 3.4, Water Quality). With no changes to water quality, adverse impacts to fish, either in the project area or downstream, are not anticipated.

Some of the habitat within the right-of-way would change from wooded to shrub or grass. However, because the converted land would be such a narrow strip (15 m [50 ft]) wide or less), most wildlife occupying the area would be displaced only temporarily or would use adjacent forested areas.

The proposed substation would eliminate approximately 0.4 ha (one acre) of grasslands (see Section 3.6.2). Because of the relative abundance of this kind of wildlife habitat in the area, and the lack of listed species or their critical habitat, this impact would be minor.

3.7.3 Cumulative Impacts

The proposal would remove approximately 0.4 ha (1 ac) of wildlife habitat in the area and would convert approximately 6.4 ha (16 acres) of wooded habitat to low-growing shrub or

grass habitat. These actions, together with other past, present and future actions in the area, such as developing Snoqualmie Ridge in the City of Snoqualmie and building the Mt. Si Substation, could adversely affect fish and wildlife by altering or reducing the amount of habitat available to them. However, the amount of habitat removed or converted by the project would be too small to noticeably contribute to local reductions of fish and wildlife populations.

3.7.4 Mitigation

- To prevent sediments from reaching surface waters and affecting fish, work within the vicinity of all streams would be undertaken during periods of low flow, and any work within wetlands or wetland buffer areas will be done during the dry season (April through mid-October).
- Tall growing vegetation that must be felled in wetlands would be left in place as wildlife habitat.
- Snags would be left for wildlife habitat if it is determined that they would not interfere with the safe construction and operation of the line.
- BPA and Tanner would provide the appropriate erosion control devices (see Section 3.4.4, Water Quality) to protect sediments from entering any of the wetlands or any of the waterways crossed by the proposed project. The erosion control devices would be left in place until the site becomes stable.

3.8 VISUAL QUALITY

Visual impacts of transmission lines are directly related to the visibility from critical view points of support structures such as steel towers or wood poles, access roads, the cleared right-of-way, conductors, insulators, and other components. Factors include the prominence of those views, duration of view, and sensitivity of the viewer. Impacts would be direct and last over the life of the transmission line.

The visibility of an object is the ability to visually differentiate that object from its setting. Two major parameters contribute to the visibility of an object: its apparent size and its apparent contrast between the object and its surroundings. Apparent size is related to viewer distance, and in viewing transmission structures, height is its most outstanding characteristic, along with the amount of right-of-way clearing, particularly through forested areas. Apparent contrast is the amount of reflected light between an object and its surroundings. In the case of transmission structures, in certain conditions, shiny conductors or steel towers may reflect a lot of light compared to their surroundings.

Another component of visual impact is the duration of view. Views of transmission facilities from residential dwellings/commercial buildings would be long term, while views from vehicle operators on roadways would be relatively brief, depending on whether the line parallels the road, on relative speed in relation to the object being viewed, and on other objects in one's view.

FIGURE 9

PHOTOSIMULATIONS of VISUAL CORRIDORS

TANNER ELECTRIC TRANSMISSION LINE PROJECT

LEGEND

- **1, 2** Looking north along SE 356th Avenue
- **3** Looking east from I-90 near Rock Bluff
- **4** Looking west from I-90 at on-ramp from North Bend Way
- **5** Looking east on North Bend Way towards SE 372nd
- **6** Looking west on North Bend Way near SE 394th Place

Proposed route

Existing BPA Transmission line

Existing PSE Transmission line

City boundary

Existing Substation

Proposed Substation

Forested area (Canopy cover)

Source: King County GIS, 1999.

N W E S

Scale 1:24000

0ft 1000ft 2000ft 3000ft 4000ft 5000ft

0km 1km

BONNEVILLE POWER ADMINISTRATION

GIS GEOGRAPHIC INFORMATION SYSTEM

dw00026 August 01, 2000

3.8.1 Affected Environment

The landscape setting in the project area is a combination of valley floor and hillside. The existing views are a mix of rural-residential land, undeveloped land, developing residential-commercial land, wetlands, grasslands, and rugged mountainous areas. The majority landscape characteristic is a closed forest, primarily conifers (Douglas fir, hemlock, and cedar), and to a lesser extent, deciduous trees such as maple, alder, and cottonwood. Overall, the visual quality of the area is high primarily due to the lush vegetation that exists there.

In the project area, there are two major arterial roadways (North Bend Way and I-90), one local access street (called Alm Way in the City of North Bend and 106th Place in unincorporated King County), and two private roads (SE 356th Avenue and SE 96th Way). I-90 carries commuters, truckers, and recreationists to and from the Puget Sound area, and is designated a National Scenic Byway in the project area by the Washington State Department of Transportation (WSDOT). Average daily traffic (ADT) on I-90 likely exceeds 50,000 vehicles per day, based on the most recent traffic counts from WSDOT (WSDOT 1998). North Bend Way serves as a major thoroughfare between North Bend and Snoqualmie as well access to and from I-90. ADT on North Bend Way is approximately 7,300 vehicles per day (King County Department of Transportation). Alm Way/106th Place primarily serves the residents of that street. Private roads provide access to residences and some businesses in the area.

The Snoqualmie Valley Railroad, a privately owned historic railroad operated by the Northwest Railway Museum in Snoqualmie, runs weekend excursion trips between North Bend and Snoqualmie Falls from early April through September. Approximately 27,000 people rode the train in 1999 (Richard Anderson, Northwest Railway Museum, e-mail February 3, 2000). The visual quality of the area as seen from the passenger cars is critical to its successful operation and continued existence.

While viewer sensitivities of motorists on I-90 vary from low to high (truckers and commuters [normally low] to recreationists [normally high]), viewer sensitivities of the Snoqualmie Valley Railroad passengers are assumed to be high.

Puget's existing electrical distribution line follows a portion of North Bend Way and Alm Way/106th Place, and a telephone line follows the same alignment as Puget's system on North Bend Way. The telephone line also continues into the right-of-way of I-90.

3.8.2 Environmental Consequences

Residents and travelers in the area, including recreationists, could be affected by the visual effect of the proposed line and substation. BPA has prepared six sets of photo simulations (six pairs of photos) showing how the new transmission line would appear along SE 356th Avenue, within the I-90 right-of-way, and along North Bend Way. The first photo in each pair shows the existing setting; the second photo simulates the transmission line in that setting. (Figure 9 shows where the photos were taken).

The proposed project would reflect light from the metal components of the project, primarily the conductors. Because the support structures would be made of natural materials (wood), their contrast (reflectively) would be low. With mitigation (see Section 3.8.4), the reflectively of the conductors would also be low. For many viewers, much of the visual impact of the transmission line would be related to right-of-way and danger tree clearing.

The entire right-of-way is not visible from a single viewpoint. Instead, the transmission line would be visible from a number of areas, including some of the residences along SE 356th Avenue, 96th Way, North Bend Way, and 106th Place/Alm Way. The transmission line would also be visible to motorists using I-90 and the other roads the line parallels, and to people travelling on the Snoqualmie Valley Railroad. In some cases, the visual impact would come from seeing a transmission line where none existed before (I-90, North Bend Way, 96th Way, 106th Place/Alm Way, and the Snoqualmie Valley Railroad). It should be emphasized, however, that Puget has an existing electrical distribution line along half of the proposed route. The proposed transmission line would replace the major portion of this distribution line.

The proposed Tanner Substation in North Bend, on what now is an undeveloped parcel, could also cause visual impacts. The substation would be within a fenced area of approximately 0.2 ha (0.45 acres), and would be visible from Alm Way and NW 8th Street south of the proposed site.

Impacts to residents and visitors. The visual impacts to residents near the northern portion of SE 356th Avenue would result primarily from right-of-way clearing and the removal of a limited number of danger trees in the 15-m (50-ft) vegetative buffer that screens the Snoqualmie Ridge Business Park (illustrated on Figures 1 and 5) from the residents' views. Clearing for the right-of-way and danger trees, including the danger trees within the 50-foot vegetative buffer, would likely remove some of the vegetation that screens the business park from the affected landowners in this area. Photo Pairs 1 and 2 show this area with and without the proposed wood pole line. Depending on the sensitivity of the viewers on the northern half of SE 356th Avenue across from the business park, the visual impact in this area would range from moderate to high, and the impacts to those on the southern half of SE 356th would likely range from low to moderate.

The proposed transmission line would create a low to moderate impact to the residents of 96th Way, depending on how prominent the transmission line would be in their view. Visual impacts to the residents would be related primarily to the amount of right-of-way clearing. The clearing also would remove about 450 m (1500 ft) of the closed canopy of vegetation over the road before the transmission line enters the I-90 right-of-way. Clearing could also increase the exposure of portions of the westbound lanes of I-90 to one household near the highway. Exposing freeway traffic may also increase the amount of noise perceived by residents adjacent to the highway. See Section 3.12.3 and Appendix B.

On the north side of North Bend Way, between I-90 and SE 384th Avenue, a 7.6-m (25-ft) wide strip, plus danger trees, would be cleared. The vegetation in this area acts as a visual buffer between the road and the adjacent residences. Although the line would be

sited within the county road right-of-way, a few danger trees may need to be removed from private property as well as from the county right-of-way. Clearing in front of some residences along North Bend Way would remove the tall growing vegetation, including some large Douglas firs, and views of the transmission line and the road would replace views of the trees for some residents. Depending on the individual residents' sensitivities and their perspective relative to the elevation of the roadway, these impacts would range from moderate to high. (See Photo Pair 3.) With mitigation (see Section 3.8.4), impacts to the overall visual quality of the area would be reduced to a low level, although some individual residents may experience the impact as high.

Additional clearing would be done along North Bend Way between Meadowbrook Way and Alm Way, although the amount of clearing would be relatively minor. The visual impacts to residents and motorists in this area would be low to moderate, depending on their sensitivities and their perspective relative to the elevation of the road. (See Photo Pair 4.)

Additional vegetation would be removed east of Alm Way/106th Place between the Snoqualmie Valley Railroad and North Bend Way for approximately 230 m (750 ft). This clearing would remove most of the vegetative buffer between the railroad tracks and North Bend Way, but the vegetation that screens the residences on Alm Way from the railroad would remain. The views of Mt. Si from the railroad at this location would be unaffected by the transmission line and related clearing. With mitigation (see Section 3.8.4), impacts to the railroad would be low. Impacts to the residents on Alm Way/106th Place would also be low.

Impacts to Motorists. WSDOT has adopted four classifications of highways within the state: Class A, Superior Scenic Qualities; Class B, High Scenic Value; Class C, Secondary Scenic Importance; and Class D, Industrial, Heavily Urbanized or Deteriorated Area. Two subclasses also exist for Classes A and B, commonly known as AX and BX. These are alternatives for Classes A and B where aerial facilities such as transmission lines could be allowed, depending on design factors such as configuration, color, and location, if they do not affect landscape quality. WSDOT has designated the I-90 corridor from Mile Post 17 to Mile Post 34 as BX. BPA proposes to place approximately 1 km (0.6 mi) of the transmission line in Mile 26 within the I-90 right-of-way, which is also within the purview of the Greenway Trust.

The proposed transmission line would create low to moderate impacts to those travelling on I-90, depending on viewer sensitivities. The line would not become the dominant view to either eastbound or westbound motorists: the dominant views to eastbound motorists would be Mt. Si; the dominant view to westbound motorists would be the foothills of the Cascades (see Photo Pairs 5 and 6). The following factors also would limit visual impacts to I-90 motorists:

- the line's relatively small size (115-kV);
- the line's limited length within the highway right-of-way (1 km [0.6 mi]);
- the use of natural materials (wood poles), in a single-pole design;
- the relative speed of viewers (60-70 miles per hour);

- the curvilinear shape of the freeway in this area; and
- the vegetative buffer between the line and the highway.

Impacts of the substation. Removing the vegetation along a portion of Alm Way east of the residences would expose the proposed substation to view by users of Alm Way and NW 8th Street, but not from North Bend Way. The proposed substation would be screened from public view from North Bend Way due to the existing vegetation between Alm Way and North Bend Way. No residences would be affected. The proposed substation would be relatively small (less than a half acre in size), have components no taller than 5.5 m (18 ft), except for a single **dead-end tower**, which would be approximately 11 m (35 ft) tall. The substation would be fenced, would have a berm on the northeast and southeast sides, and would be landscaped. With mitigation, the visual effects of the proposed substation on the visual quality of the area would be low.

3.8.3 Cumulative Impacts

The proposed action would add a utility line in areas where overhead utilities already exist as well as in new locations. Combining utilities on one set of poles, however, helps to offset the cumulative visual impacts associated with overhead lines in the area. Constructing a single substation in the North Bend to serve the needs of two utilities (Tanner and Puget) would also reduce the cumulative visual impacts of providing this service.

Nevertheless, constructing a new utility line in the area would add to the visual intrusion already placed on the natural environment by existing development. The cumulative visual impacts of the proposed action when added to the visual impacts of past, present, and future developments in the area, would add to the intrusion on the visual quality of the area.

Because government authorities likely would require visual mitigation for present and future development projects, such as the City of North Bend's landscaping requirement for the proposed substation, it is not expected that the proposed action, when added to other past, present, and reasonably foreseeable future actions, would create high cumulative impacts on the visual quality of the area. By combining the facilities needed by several entities, the proposed project reduces the cumulative effects of each entity serving its needs with its own facilities.

3.8.4 Mitigation

- BPA would work with the City of Snoqualmie and the Snoqualmie Ridge Business Park when adding additional vegetation to the west side of the 50-foot vegetative buffer on Quadrant property that was set aside to screen the business park from public view.

- Vegetation would be planted along North Bend Way to partially screen those properties where the majority of the tall growing vegetation would be removed between residences and the county road, and where the visual impacts are high.
- At their request, BPA would work with the landowners along North Bend Way to site the proposed wood pole structures so that the transmission line is least disruptive to their views.
- A plant specialist would assist with identifying the appropriate plant species to reduce the visual impacts to the residents, Snoqualmie Valley Railroad passengers, and I-90 travelers resulting from removal of tall growing vegetation. BPA would consult with the Greenway Trust before undertaking any plantings within the I-90 right-of-way.
- Existing roads would be used for access, where possible.
- All disturbed areas, including any access roads constructed in the I-90 right-of-way, would be re-seeded following construction activities.
- At the request of representatives of WSDOT, within the I-90 right-of-way no trees would be topped.
- Darkened wood poles would be used to reduce their visibility.
- Non-reflective conductors would be used to reduce their shininess in certain light conditions.
- Any trees removed from the state right-of-way would be disposed of according to the requirements of the state and the Greenway Trust.
- Any trees that would be removed from the county right-of-way would be offered to the adjacent landowners at no expense.

3.9 SOCIOECONOMICS

3.9.1 Affected Environment

Background. The socioeconomic environment of the Snoqualmie/North Bend area has been influenced primarily by its proximity to the large urbanized centers in the Puget Sound area, the rugged beauty of the northern Cascades, and the excellent transportation network that provides access to the region. The area is served by I-90 to the northeast and southeast and State Route 18 (SR-18) to the south, which connects to Interstate 5. Current traffic volume on I-90 in the project vicinity exceeds 50,000 vehicles per day, based on the most current estimates published by the Washington State Department of Transportation in 1998. The 1997 traffic projection for Mile Post 26, just east of SR 18, was estimated at 49,000 vehicles per day during that year (WSDOT 1997). Although no recent traffic counts have been taken on North Bend Way within unincorporated King County, 1999 projected daily traffic for the county road west of SE Meadowbrook Way was 9200 vehicles, and 4900 vehicles for the county road east of SE Meadowbrook Way

(Johnnie Walker, Senior Engineer, Historic Traffic Counts 1989-1999, King County Department of Transportation, telephone communication, February 18, 2000).

Population. Both Snoqualmie and North Bend are relatively small rural communities in central King County. The City of North Bend's 1999 population (as of April 1999) was approximately 3800 and the City of Snoqualmie's population was approximately 2000 (State of Washington, Office of Financial Management 1999).

Economy. Until about the mid-1900s, the local economy was resource-based, i.e., logging, mining, and to some degree agriculture. Over the years, it evolved to a service-based economy—primarily retail, but also finance, insurance, real estate, and ancillary services. Many who live and work in the area depend on the economic health of the large urban centers in the Puget Sound region. Many people reside in the local area but travel to the Seattle, Tacoma, or Renton areas to work.

Ethnicity. The 1990 Census identified the ethnicity of North Bend and Snoqualmie to be predominantly Caucasian, i.e., 97.1 percent and 94.5 percent respectively; and the remainder to be primarily Asian, African-American and American Indian (USDC 1990).

Per Capita Income. The per capita income for King County residents in 1990 (based on 1990 Census, Summary Tape File 3A, the most recent information available) was $18,587. This level of income was higher than the state as a whole and also higher than both Snoqualmie and North Bend residents during that year (North Bend's per capita income was $13,770 while Snoqualmie's was $12,065). Snoqualmie's relatively low per capita income level resulted in a greater percentage of the city's income earners falling below the poverty level (13.3 percent) than income earners countywide (10.9 percent). Less than 7 percent of the income earners in the North Bend had incomes below the poverty level during this same year (USDC 1990b). Although the 1990 Census showed per capita income levels in the local area as low relative to the state and county, both Snoqualmie and North Bend likely will show a marked increases in relative income levels in the 2000 Census. This increase is expected as a result of the substantial growth of middle-income earners moving into the area during the 1990s (Chandler Felt, Demographer, King County Office of Regional Policy and Planning, telephone communication, April 21, 2000).

Property Taxes. Property taxes help support the activities of local taxing districts such as local government and public schools. Most private property is subject to local property taxes unless in a tax-exempt status. Entities commonly exempt from local property taxes are local, state, and federal government entities (such as BPA). Local public utility districts (such as Tanner Electric) normally are not exempt (Steven Yergeau, Manager, Utilities and Right-of-way Section, Washington State Department of Revenue, telephone communication, March 11, 2000).

When BPA acquires easements across private property, the land remains under control of the property owner, and the landowner continues to pay property taxes on the entire parcel, including that within any right-of-way purchased by BPA. Because use of the land within BPA's easements contains restrictions, assessed values are often adjusted downward by the local taxing authorities if it can be shown that the use of a parcel has been adversely affected. As a property's value is adjusted downward, so too are the taxes paid on an individual property.

Sales Taxes. Washington State sales taxes are currently assessed on the value of goods and services sold within the state. The sales tax rate in the North Bend/Snoqualmie area is currently 8.2 percent (Beth Brown, Tax Information Specialist, Washington State Department of Revenue, telephone conversation, December 29, 1999). Of this amount, 6.5 percent of the sales tax goes to the state and 1.7 percent to the local entity (King County Assessor's Office).

Property Values. When BPA acquires rights-of-way, landowners are offered fair market value for the land. Fair market value is determined through the appraisal process, which accounts for all factors affecting value, including the impact the transmission line may have on the remaining portion of the property. Each property is appraised individually using neighborhood-specific data to determine fair market value. BPA pays only for the rights to use the right-of-way it acquires and for impacts to the property through which the right-of-way passes; it cannot pay for impacts, such as visual impacts, to owners of property adjacent to the property occupied by its facilities.

3.9.2 Environmental Consequences

Short-term Construction Impacts. Short-term socioeconomic impacts of the project include a temporary increase in economic activity from workers in the area, temporary traffic disruptions, and increases in the amount of noise and dust. (See also Section 3.12 and Appendix B for a discussion of noise impacts.)

Because BPA's decision to proceed with the project would not be made until the agency has concluded its environmental review, it is not known who would build the project. If BPA decides to proceed, the agency would advertise for a contractor(s) to undertake the work. Based on past experience with projects of this size, it is reasonable to conclude that a contractor would use from 8 to 12 workers to clear the right-of-way and construct the access roads, and a similar number to construct the transmission line. All the work necessary to construct the project likely would take three to four months.

Because transmission line construction is highly specialized, few construction companies exist locally. While it is possible that a firm could be selected from the Seattle area, it is likely that bids also would be received from such places as Oregon, Idaho, and Colorado.

Clearing and access road work is less specialized than transmission line construction, and it is likely that local contractors could do this work. While research shows that non-local contractors spend as much as 40 percent of their income locally, the figure would be higher for local workers. Expenditures by both local and non-local contractors would have a positive but minor on the local economy due to the small number of workers and the short time required for construction.

Work would begin with a clearing crew who would remove tall growing vegetation in the right-of-way and danger trees. Access road work would be done concurrently with clearing, followed by construction of the transmission line. Then it is likely that Puget would transfer its distribution line along North Bend Way to BPA's wood pole structures. Construction impacts might include some disruption to normal traffic flow on private, city, and county roads, causing minor traffic delays or temporary road closures for brief

periods. Impacts would be temporary and limited to the immediate project area. No interruptions to traffic flow on I-90 are anticipated.

Construction of the proposed Tanner Substation is expected to cause only minor short-term construction impacts, because of the relative isolation of the substation site, off SE Alm Way, and the relative ease of access from the southeast, where no residents would be affected. This work would probably create only limited new employment opportunities locally, as Tanner would use existing employees for much of the work, and the manufacturer would install the substation's transformer.

Growth Inducing Impacts. The proposed action by itself is not expected to induce growth in the local area, although it enables it to occur. The proposed substation is intended to serve Tanner's existing customers in the local area as well as new customers. However, no single individual power sale is driving the need for this project, nor are any large scale power sales envisioned by Tanner or Puget as a result of the proposed action.

Property Value Impacts. The proposed transmission line is not expected to have long-term impacts on property values in the area. Whenever land uses change, the concern is often raised as to the effect the change may have on property values nearby. Zoning is the primary means that most local governments use to protect property values. By allowing some uses and disallowing others, or permitting them only as conditional uses, conflicting uses are avoided. Some residents consider transmission lines to be an incompatible use adjacent to residential areas. However, this feeling is not universal. Transmission lines are an allowed use in the zoning districts in which the line would be located. (See Figure 6 and Section 4.5, Plan and Program Consistency.)

The question of whether nearby transmission lines can affect residential property values has been studied numerous times in the United States and Canada over the last twenty years or so, with mixed results. In 1995, BPA contributed to the research when it looked at the sale of 296 pairs of residential properties in the Portland, Oregon metropolitan area (including Vancouver, Washington) and in King County, Washington. The study evaluated properties adjoining 16 BPA high voltage transmission lines (subjects) and compared them with similar property sales located away from transmission lines (comps). All of the sales were in 1990 and 1991 and adjustments were made for time and other factors. The results of the study showed that the subjects in King County were worth approximately 1 percent less than their matched comps, while the Portland/Vancouver area subjects were worth almost 1.5 percent more (Cowger et al. 1996).

BPA recently updated this earlier study using 1994/95 sales data. The sales of 260 pairs of residential properties in King County and Portland/Vancouver metropolitan areas were reviewed. The information confirmed the results of the earlier study, i.e., the presence of high voltage transmission lines does not significantly affect the sale price of residential properties. The residential sales did, however, identify a small but negative impact from 0 to 2 percent for those properties adjacent to the transmission lines as opposed to those where no transmission lines were present. Although this study identified a negative effect, the results are similar to the earlier study and the differences are relatively small (Cowger et al., no date, in draft).

Studies of impacts during periods of physical change, such as new transmission line construction or structural rebuilds, generally have revealed greater short-term impacts

than long-term effects. However, most studies have concluded that other factors, such as general location, size of property, improvements, condition, amenities and supply and demand factors in a specific market area are far more important criteria than the presence or absence of transmission lines in determining the value of residential real estate.

As a result of the proposed project, some short-term adverse impacts on property values (and salability) might occur on an individual basis; however, these impacts would be highly variable, individualized, and unpredictable. Constructing the transmission line is not expected to cause long-term adverse effects to property values along the right-of-way or in the general vicinity. Non-project impacts, along with other general market factors, are already reflected in the market value of properties in the area. These conditions are not expected to change appreciably. Therefore, no long-term impacts to property values are expected as a result of the proposed project.

Property Tax Impacts. The proposed action would have no direct beneficial effect on the local taxing districts because BPA, as a federal agency, is exempt from local taxes. Conversely, the proposed action could have a minor but negative impact on local taxing authorities if any properties are devalued as a result of limits the proposed easement might impose on the highest and best use of a parcel. Offsetting any such decrease, however, could be the increase in the amount of taxes collected by the taxing authorities as a result of the increase in development that might be enabled by the additional supply of power.

Only about 2.4 km (1.5 mi) of the 7.2-km (4.5-mi) transmission line would be on private property. No major property improvements would be removed nor would the use of a property be affected enough to substantially reduce property values and taxes. Therefore, no impacts to the local taxing districts are expected.

Taxes paid by Tanner Electric on the substation property could be considered a beneficial impact but would not significantly contribute to local revenues (see below).

Sales Tax Impacts. BPA, as a federal government agency, is exempt from paying state sales taxes (WAC 458-20-190), although any contractor retained by the agency is required to pay either a sales or use tax on the purchase of supplies and equipment used in the construction of the project (WAC 458-20-190).

In addition to the sales taxes that would be paid on the value of supplies and equipment used in project construction, sales taxes would also be collected on local expenditures made by construction workers. Although it is not known at this time who would build the project, should it be constructed, the construction crews would likely reside outside of the local area. Research shows that non-local workers typically spend about 40 percent of their pay locally. With an after-tax payroll of approximately $800,000 for the transmission portion of the project, the proposed action would generate approximately $26,000 in state sales taxes. While the tax revenues would be considered a beneficial impact, only a small percentage stays in the local community.

Tanner also would pay either a sales or use tax on the purchase of supplies and equipment to construct the substation, as well as property taxes based on the value of the facility. Although this combination of sales/use taxes and property taxes paid by Tanner could be

considered a beneficial impact to the local taxing district, the amount would contribute far less than 1 percent of either local or state revenues.

Operation and Maintenance Impacts. Operation and maintenance impacts are anticipated to be about the same as for other transmission lines in the area. (See also Section 3.11 Health and Safety.) Maintenance activities would include periodic helicopter or ground patrols to check the line to assure that it can be operated in a safe and reliable manner. BPA crews remove tall growing vegetation within rights-of-way every 2-8 years, depending on vegetation growth rates. Emergency repairs could be made at any time. Such routine and emergency activities are expected to be infrequent and minor, so these impacts are expected to be slight.

3.9.3 Cumulative Impacts

The cumulative socioeconomic impact of adding a transmission line and substation to the local infrastructure is a beneficial one in that the facilities ensure an adequate power supply for community needs.

The project is not expected to provide employment in numbers or for a duration that, when added to other employment opportunities in the area, would substantially affect the community's economic health. Likewise, the potential tax benefits and impacts are unlikely, even when combined with other activities affecting taxes, to measurably benefit or adversely affect either individuals or governments.

3.9.4 Mitigation

To mitigate the long-term impacts to property values as a result of any diminished use of property created by an easement across a property, BPA would compensate landowners based on any limitations of use or utility imposed by the right-of-way. Such limitations would be identified during the appraisal process.

3.10 CULTURAL RESOURCES

3.10.1 Affected Environment

A number of federal laws and regulations have been enacted to protect the nation's archaeological, cultural, and historical resources. These include the National Historic Preservation Act, the Archaeological Resources Protection Act, the American Indian Religious Freedom Act, the National Landmarks Program, and the World Heritage list.

The National Historic Preservation Act and the Archaeological Resources Protection Act were enacted into law to protect archaeological and historic resources from damage, desecration or loss to federally sponsored or permitted projects and from excavation or removal from federal and Indian lands. The American Indian Religious Freedom Act assures that federal activities do not impair access to religious sites and will not affect

ceremonial rites of American Indians. The National Historic Preservation Act requires that the effects of any federally assisted undertaking on cultural, archaeological or historic resources must be evaluated. For properties on or eligible for listing on the National Register of Historic Places, the responsible federal agency must consult with the State Historic Preservation Office (SHPO) regarding any potential adverse effects on resources of historic, archaeological, or cultural significance.

3.10.2 Environmental Consequences

BPA contracted with an archaeological and cultural resources firm, Historical Research Associates, Inc. (HRA) of Seattle, to undertake a literature review and field survey for the proposed project and one of the alternatives (Alm Way Alternative) in November, 1999. The firm completed its work in early March 2000. HRA located no significant prehistoric or historic cultural resources that would be affected by construction, operation, or maintenance of the proposed transmission line or substation (Appendix A). In a letter dated March 23, 2000, the SHPO concluded that no properties listed or eligible for listing in the National Register of Historic Places would be affected.

3.10.3 Cumulative Impacts

Constructing a new transmission line in the area could impact cultural resources not encountered during the cultural resources survey cited above. If additional cultural resources are encountered during construction activities, appropriate action would be undertaken to protect them.

3.10.4 Mitigation

If any archaeological artifacts, including any human skeletal remains, are encountered during project construction, BPA will fulfill its responsibilities under 36 CFR, Part 800 of the National Historical Preservation Act, by suspending all work in the area of impact, consulting with the SHPO and other involved agencies or tribes to assess the significance of the find, and developing mitigation measures, if warranted, to mitigate any damage to the resource. Should any archaeological resources be identified, BPA would comply with the requirements of the Archaeological Protection Act of 1979, which protects archaeological resources on publicly owned and Indian lands.

3.11 HEALTH AND SAFETY

3.11.1 Affected Environment

Safety Precautions. Power lines, like electrical wiring, can cause serious electric shock if certain precautions are not taken. These precautions include building the lines to

minimize the shock hazard. All BPA lines are designed and constructed in accordance with the National Electrical Safety Code (NESC). NESC specifies the minimum allowable distances between the lines and the ground or other objects. These requirements basically determine the width of the right-of-way, the distance between structures, and the height of the line to limit electric field effects to acceptable levels.

People must also take certain precautions when working or recreating near power lines. It is extremely important that a person not bring anything, such as a TV antenna or irrigation pipe, too close to the lines. BPA provides a free booklet that describes safety precautions for people who live or work near transmission lines entitled *Living and Working Around High Voltage Power Lines.*

Power lines can also induce **voltage** into objects near the lines. This effect can lead to nuisance shock if a voltage is induced on something like wire fencing that is on wood posts and, therefore, insulated from ground, and on vehicles parked under the lines. Usually, however, this becomes a problem only with lines of voltages above 230-kV and is extremely unlikely to occur at this project. Should problems develop with either high- or low-voltage lines, they can be corrected by simple grounding techniques.

Electric and Magnetic Fields. Everything electrical, including power lines, household wiring and appliances, produces electric and magnetic fields (EMF). Movement of electrons in a wire (current) produces magnetic fields, and electrical pressure (voltage) produces electric fields. Both of these fields are reduced in strength with increasing distance from the source.

Electric Fields. Domestic electric fields are highly variable and, on average, typically range from 0.005 kilovolts per meter (kV/m) to 0.02 kV/m (Bracken 1998). Electric fields from household appliances are usually less than 0.1 kV/m at 30 cm (1 ft) (U.S. DOE 1995). Electric fields at the edge of a typical 115-kV right-of-way are 0.5 kV/m (U.S. DOE 1995). While electric fields are stronger near power lines than in typical residential settings, they are easily weakened by vehicles, trees, and buildings.

Magnetic Fields. Magnetic fields from power lines fluctuate with changing loads: the greater the load, the greater the magnetic field. Transmission line magnetic field strength also depends upon the number of lines, line design and line configuration (relative phasing of the conductors). A typical 115-kV line normally may be associated with a 6.5 milligauss (mG) magnetic field at the edge of the right-of-way (U.S. DOE 1995).

A large study (Zaffanella 1993) concluded that magnetic fields in residences exceeded 0.6 mG in half of the 996 homes studied. This study also found that power lines produced the largest average fields, residential grounding systems produced the highest overall fields, and appliances produced the highest localized fields. For example, the median field found near microwave ovens was 36.9 mG at a distance of 0.27 m (10.5 in) and 2.1 mG at 1.2 m (46 in). This last point illustrates the fact that magnetic fields close to appliances are often stronger than those beneath power lines. However, appliance-generated fields drop off much more rapidly with distance than those from power lines. The same researchers recently completed a large study of daily personal EMF exposures in the U.S. (Zaffanella and Kalton 1998), which concluded that the average 24-hour EMF exposure for the randomly selected participants was 1.2 mG.

Figure 10

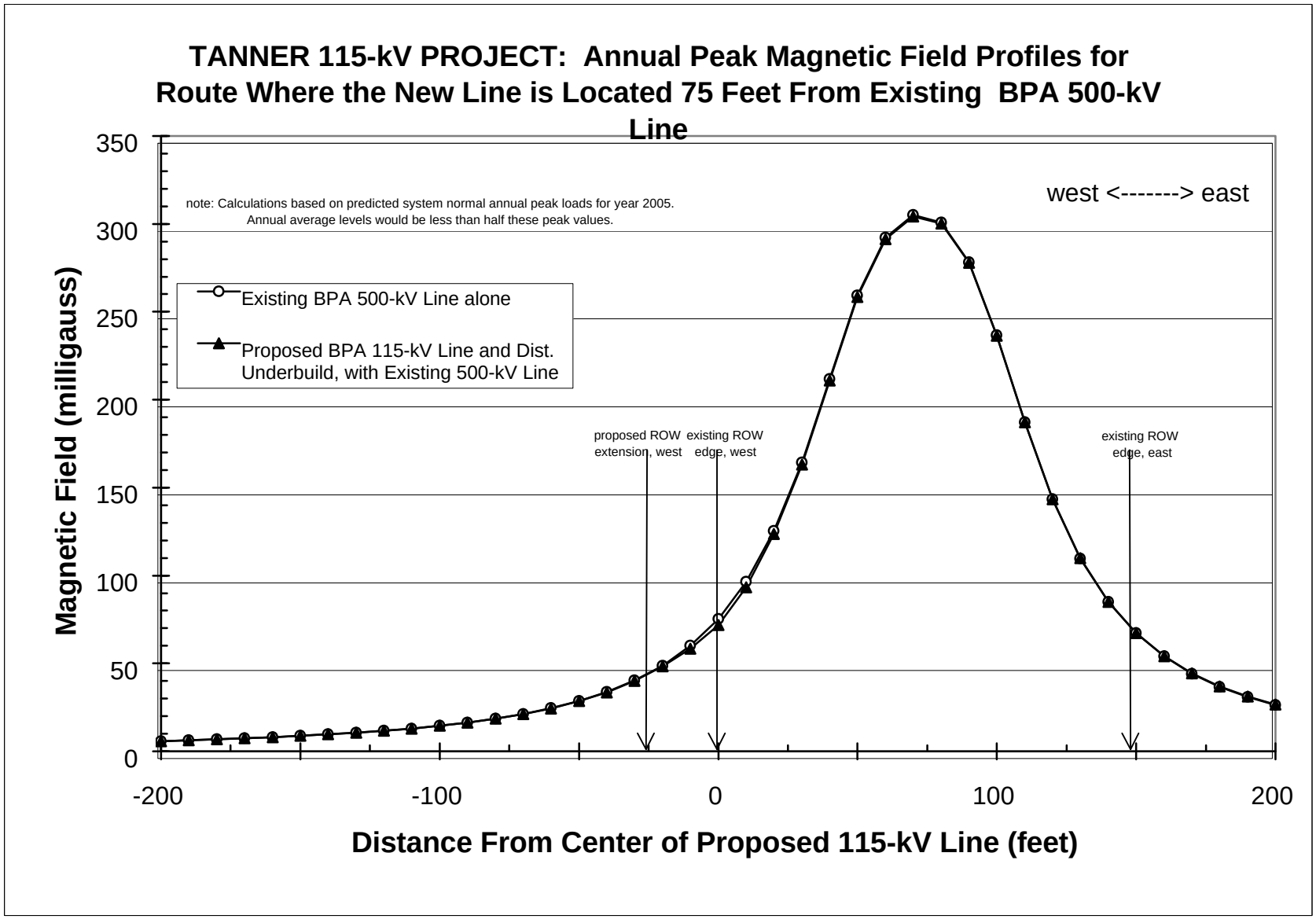

TANNER 115-kV PROJECT: Annual Peak Magnetic Field Profiles for Route Where the New Line is Located 75 Feet From Existing BPA 500-kV Line
note: Calculations based on predicted system normal annual peak loads for year 2005.
Annual average levels would be less than half these peak values.
west <-------> east
Existing BPA 500-kV Line alone
Proposed BPA 115-kV Line and Dist. Underbuild, with Existing 500-kV Line
proposed ROW extension, west
existing ROW edge, west
existing ROW edge, east
Magnetic Field (milligauss)
350
300
250
200
150
100
50
0
-200
-100
0
100
200
Distance From Center of Proposed 115-kV Line (feet)

Figure 11

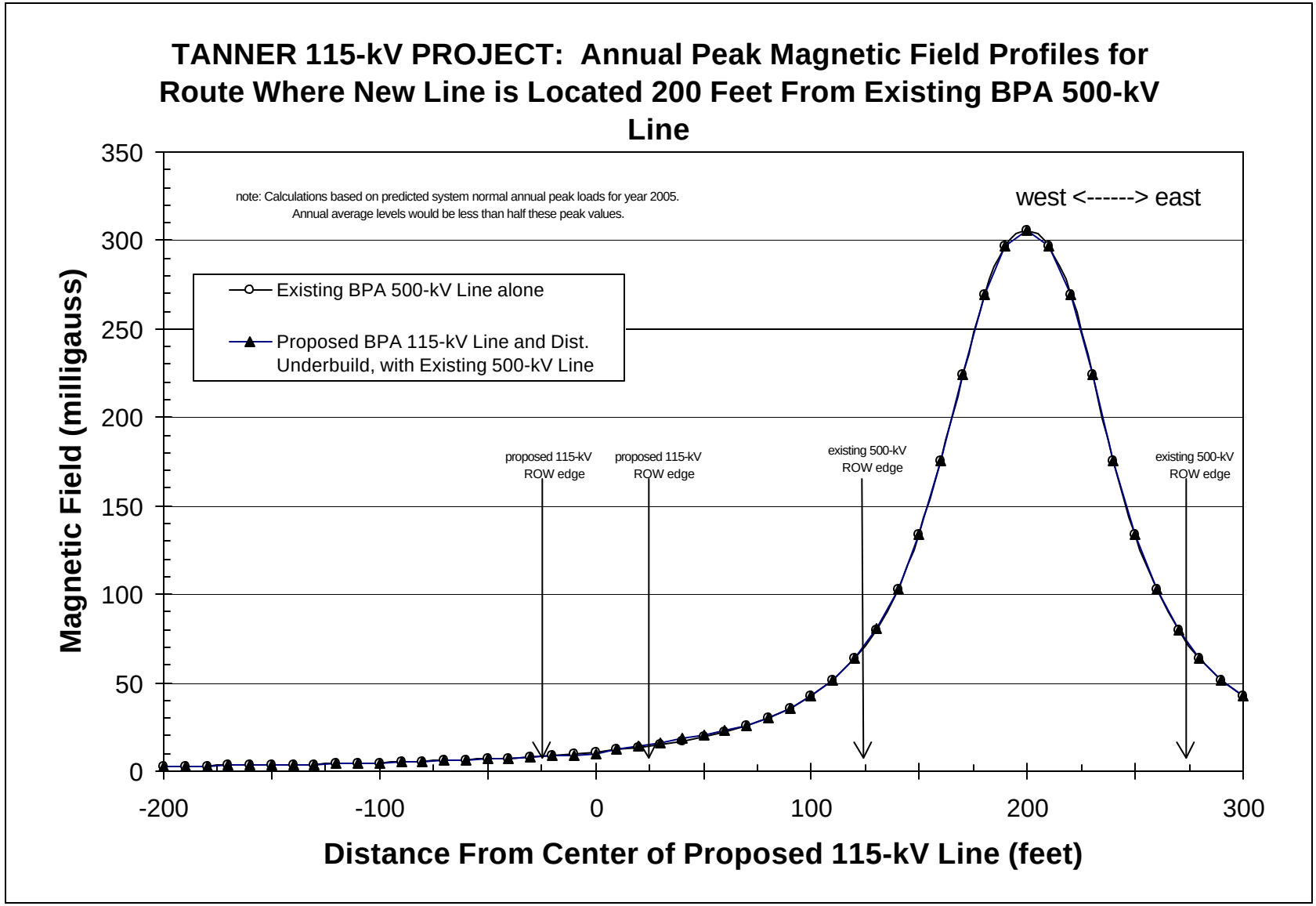

TANNER 115-kV PROJECT: Annual Peak Magnetic Field Profiles for Route Where New Line is Located 200 Feet From Existing BPA 500-kV Line
note: Calculations based on predicted system normal annual peak loads for year 2005.
Annual average levels would be less than half these peak values.
west <------> east
Existing BPA 500-kV Line alone
Proposed BPA 115-kV Line and Dist. Underbuild, with Existing 500-kV Line
proposed 115-kV ROW edge
proposed 115-kV ROW edge
existing 500-kV ROW edge
existing 500-kV ROW edge
Magnetic Field (milligauss)
350
300
250
200
150
100
50
0
-200
-100
0
100
200
300
Distance From Center of Proposed 115-kV Line (feet)

Figure 12

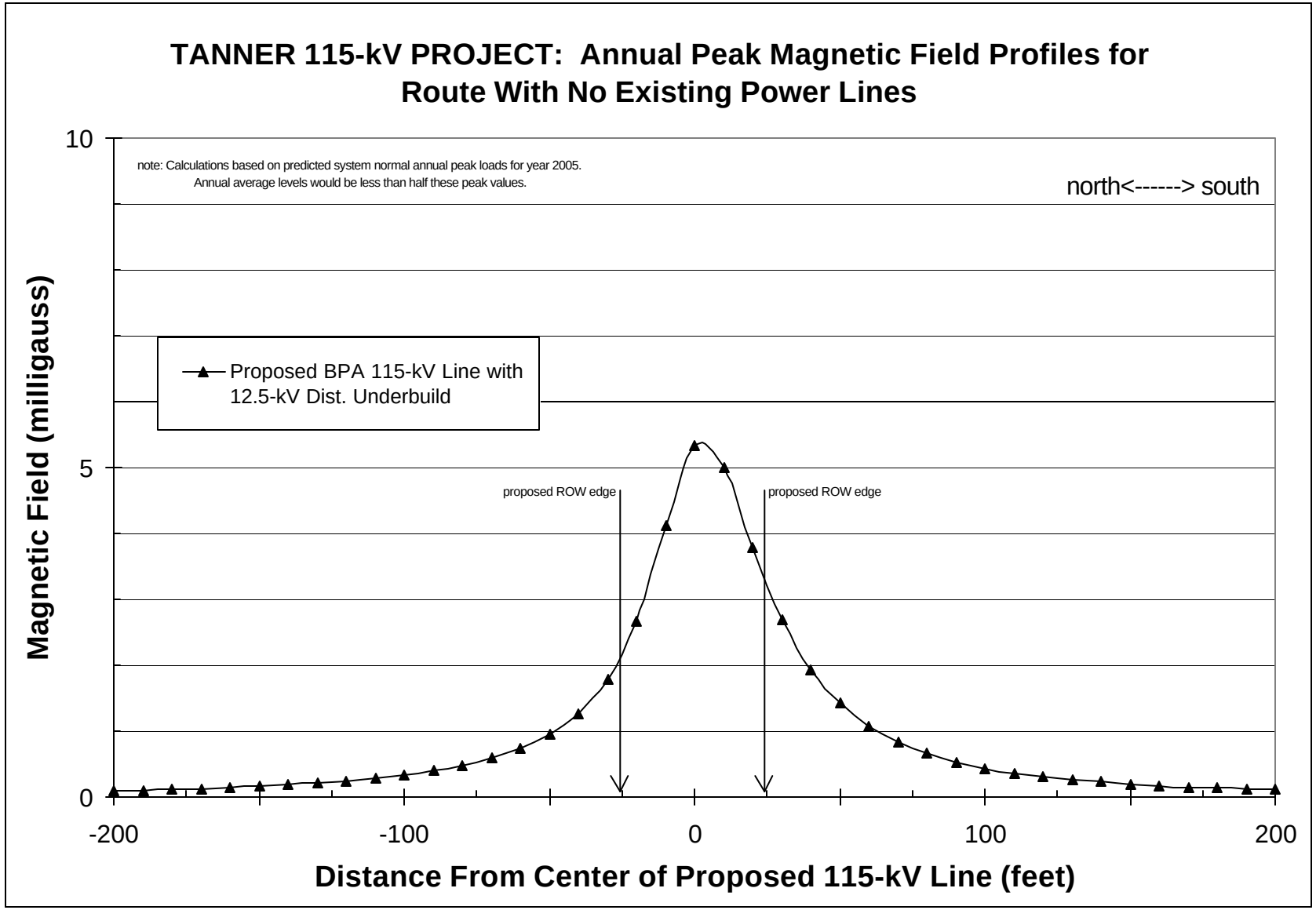
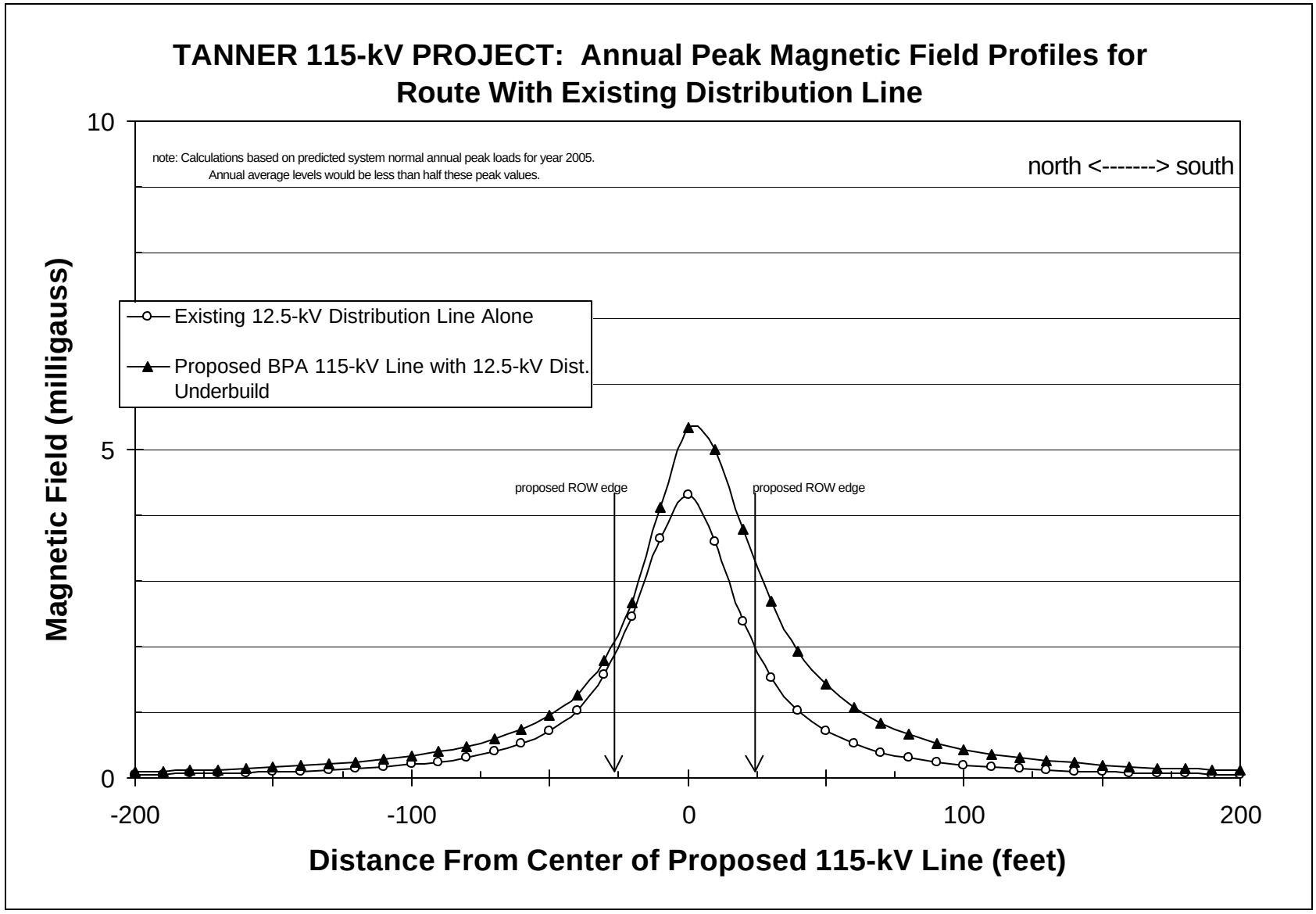

TANNER 115-kV PROJECT: Annual Peak Magnetic Field Profiles for Route With No Existing Power Lines
note: Calculations based on predicted system normal annual peak loads for year 2005.
Annual average levels would be less than half these peak values.
north<------> south
Proposed BPA 115-kV Line with 12.5-kV Dist. Underbuild
proposed ROW edge
proposed ROW edge
Magnetic Field (milligauss)
10
5
0
-200
-100
0
100
200
Distance From Center of Proposed 115-kV Line (feet)

Figure 13


TANNER 115-kV PROJECT: Annual Peak Magnetic Field Profiles for Route With Existing Distribution Line
note: Calculations based on predicted system normal annual peak loads for year 2005.
Annual average levels would be less than half these peak values.
north <-------> south
Existing 12.5-kV Distribution Line Alone
Proposed BPA 115-kV Line with 12.5-kV Dist. Underbuild
proposed ROW edge
proposed ROW edge
Magnetic Field (milligauss)
10
5
0
-200
-100
0
100
200
Distance From Center of Proposed 115-kV Line (feet)

Typical electric and magnetic field strengths for some BPA transmission lines are illustrated in Table 3.

3.11.2 Environmental Consequences

Regulations. There are no national standards for low-level electric or magnetic fields; however six states have established electric field standards for transmission lines. Only New York and Florida have established magnetic field standards. The State of Washington has not set a standard for either. BPA has set a maximum allowable electric field of 5 kV/m at the edge of its rights-of way and at road crossings. Additionally, BPA has set maximum allowable electric field strengths for 115-kV lines of 3.5 kV/m and 2.5 kV/m at shopping center parking lots and commercial/industrial lots respectively (Gens, Ralph, Chief Engineer, Bonneville Power Administration "Electric Field Strength Policy for BPA Transmission Lines," June 6, 1979). These levels are set to eliminate nuisance shocks. The proposed action would meet BPA's electric field standards.

Table 3 Typical Electric and Magnetic Field Strengths from BPA Transmission Lines

Transmission Lines	***Electric Fields*** **(kV/m)[1]**	***Magnetic Fields*** **(mG)[2]**	
		Maximum[3]	**Average[4]**
115-kV			
Maximum on right-of-way	**1.0**	**63**	**30**
Edge of right-of-way (50 ft)	**0.5**	**14**	**7**
61 m (200 ft.) from center	**0.01**	**1**	**0.4**
230-kV			
Maximum on right-of-way	**2.0**	**118**	**58**
Edge of right-of-way (50 ft)	**1.5**	**40**	**20**
61 m (200 ft.) from center	**0.05**	**4**	**2**
500-kV			
Maximum on right-a-way	**7.0**	**183**	**87**
Edge of right-of-way (65 ft)	**3.0**	**62**	**30**
61 m (200 ft.) from center	**0.3**	**7**	**3**

1. kV/m=kilovolt per meter
2. mG=milligauss
3. Under annual peak load conditions (occur less than one percent of the time)
4. Under annual average loading conditions
5. Measured from the right-of-way centerline.

Note: Information on magnetic fields obtained from BPA study to characterize nearly 400 transmission lines in the Pacific Northwest.

Health Effects.

Electric Fields. Alternating current electric fields, such as those emitted from power lines, can create induced electric currents in people; however, these effects typically are associated with high-voltage lines (230-kV or higher) and are generally considered a nuisance. Electric fields are not associated with cancer. Induced current is extremely unlikely to occur at the edge of this project's right-of-way (7.6 m [25 ft] from centerline).

Magnetic Fields. Numerous studies have been conducted over the last 30 years in an effort to determine whether EMF is a carcinogen or has other detrimental effects on health. Recently two different groups of scientists reviewed all existing EMF research to determine the conclusions, if any, that could be drawn about the relationship of EMF and human health. The National Academy of Sciences (NAS) reviewed EMF research completed by 1995 for the National Research Council (NRC); and the National Institute of Environmental Health Sciences (NIEHS) reviewed EMF research completed by 1998 as part of the Electric and Magnetic Fields Research and Public Information Program. This program (referred to as the Department of Energy's (DOE) RAPID program) was authorized by the U.S. Congress in the 1992 Energy Policy Act (PL 102-486, Section 2118) and was administered and funded by DOE in 1999.

- The NAS committee concluded that: "The data at different biological complexities taken in total do not provide convincing evidence that electric and magnetic fields experienced in residential environments are carcinogenic." (NRC 1997:198) The committee also identified weakness in the research and suggested that more research is needed.
- The NIEHS concluded that while EMF exposure "cannot be recognized as entirely safe," the evidence for risk to cancer and other diseases was "weak" and the probability that EMF exposure is a health hazard is "small" and "…insufficient to warrant aggressive regulatory concerns." NIEHS found a lack of consistent positive findings in animal or mechanistic studies, but statistical studies looking at the incidence of disease in a population (epidemiology) raised concerns over childhood leukemia and adult chronic lymphocytic leukemia from occupational exposure to EMF. Because everyone is exposed to EMF and because the epidemiological studies showed areas of concern, the NIEHS recommend continued research and passive regulatory action to reduce EMF exposure.

Magnetic Field Analysis and Exposure Assessments. Because the state of the scientific evidence relating to EMF has not yet established a cause-and-effect relationship between electric or magnetic fields and adverse health effects, we are unable to predict specific health risks or specific potential level of disease related to exposure to EMF. We are, however, able to conduct exposure assessments of magnetic fields from transmission lines. Exposure assessments are estimates of the field levels to which people are potentially exposed.

An EMF exposure assessment is done by first estimating what future EMF levels would be without the new project. This analysis serves as a baseline measurement. Engineers then estimate the possible change in field levels assuming the proposed project is in

place. An increase in public exposure is defined as a situation where field levels with the new project will increase and buildings exist nearby.

Project-Specific Exposure Estimates. Calculations for this project's exposure assessment were based on the predicted normal system annual peak loads for 2005. Using peak loads for these calculations gives the worst-case scenario and significantly overestimates the potential EMF exposure. More realistic annual average levels would be less than half the peak values predicted in these calculations (see Figures 10-13).

- Calculations for this project's normal peak loading predict that there would be no change in EMF where the proposed project parallels the existing BPA 500-kV line. This is because the existing 500-kV line dominates the EMF profile. There is no increase in exposure because EMF levels did not increase (see Figures 10 and 11).
- Because there are no existing distribution or transmission lines on the proposed section of line running southeast from the 500-kV line to I-90, there would be an increase in EMF, but levels at the edge of the right-of-way will remain less than 3 mG (see Figure 12). There are no homes within 7.6 m (25 ft) of this section of proposed line, so there would be no increase in exposure.
- There is no significant increase in the magnetic field along the northern edge of the proposed right-of-way paralleling North Bend Way; however, there is a 1-mG increase along the southern edge (see Figure 13). This increase in magnetic field strength does not correspond to an increase in exposure to residences along North Bend Way because the increase would occur along the existing county easement, or on undeveloped land, and not in nearby residences.
- There also is a 1-mG increase along the southern edge of the transmission line as it parallels Alm Way. This increase does not correspond to an increase in exposure levels because there are no homes within 30 m (100 feet) of the right-of-way (see Figure 13).

3.11.3 Mitigation

The transmission line would be constructed so that two phases of the three-phase transmission line would be placed on the south side of the line. This configuration would minimize the magnetic fields at the edge of the right-of-way for residents on the north side of North Bend Way.

3.12 NOISE AND RADIO/TV INTERFERENCE

3.12.1 Audible Noise

Construction activities and operation of some transmission facilities create noise. Construction noise could be heard intermittently over a 3-4 month period and would be limited to normal working hours. Typically it does not result in serious disturbances to residents.

Audible noise produced by transmission line corona is a hissing, popping, or crackling sound. It is primarily associated with lines of 345-kV and above. A 120-Hertz (Hz) "hum" is also occasionally super-imposed on the corona-generated noise. The sound level depends on the ambient noise level, conductor and tower geometry, operating voltage, and weather. Audible noise from transmission lines increases in wet weather.

The Noise Control Act of 1972 gives the states the responsibility for noise control. In Washington, this responsibility has been passed on to the counties. In unincorporated King County the county has responsibility for implementing the County Noise Ordinance. In the incorporated cities within King County, the cities have assumed this responsibility. North Bend has its own noise ordinance.

No transmission line noise is expected because the proposed transmission line is less than 345 kV. The proposed Tanner Substation will contain a 115/12.5-kV transformer. Transformers commonly transmit a low-frequency hum. Tanner Electric would use a transformer that would conform to the City of North Bend Noise Ordinance. See also the Environmental Noise Analysis (Section 3.12.3) and Appendix B.

3.12.2 Radio and Television Interference

Corona occurs where high electric field strength on conductors, insulators, and hardware imparts sufficient energy to charged particles to cause ionization (molecular breakdown) of the air. Corona may interfere with radio and television reception by generating a high-frequency noise called electromagnetic interference or EMI. EMI is the static sometimes heard over an automobile radio when driving beneath high-voltage lines. It is usually associated with higher voltage lines, i.e., 345 kV and above. Because the proposed 115-kV project is less than 345 kV, it should not interfere with radio or television reception.

Federal Communications Commission (FCC) regulations require that incidental radiation devices (such as transmission lines) be operated so that radio and television reception will not be seriously degraded or repeatedly interrupted. Furthermore, FCC regulations require that the operators of these devices mitigate such interference, should they occur. Overall, BPA receives very few radio interference (RI) or television interference (TVI) complaints. Essentially, all legitimate complaints are satisfactorily corrected. As a result of these factors RI/TVI impacts would be minimal.

3.12.3 Environmental Noise

Clearing vegetation between noise generating land uses (such as arterial roadways I-90 and North Bend Way) and noise sensitive properties (such as residential properties located adjacent to these rights-of-way) could affect the noise perceived by the residents. To determine the level of impact, BPA retained the services of McCulley, Frick & Glickman, Inc., a firm specializing in environmental consulting and engineering services, in Lynwood, Washington, to conduct a noise impact assessment. Their analysis (see Appendix B) found that the proposed project would not result in any discernible increase in noise to the residents near these arterial roads.

3.12.4 Mitigation

BPA would rectify any TV/radio interference caused by the proposed project, although interference is not anticipated.